

IN THE CLAIMS:

The following list of claims replaces all prior listings and versions of claims in this application:

1. (Currently Amended) A semiconductor structure comprising:
a semiconductor substrate of a first material comprising germanium or a Group(III)-Group(V)-semiconductor or alloy thereof;
a crystalline epitaxial graded buffer layer upon the first material; and
a crystalline epitaxial substantially relaxed layer on the buffer layer wherein the buffer layer is sufficiently relaxed to provide relaxation of the substantially relaxed layer deposited thereon, wherein the graded buffer layer has a concentration of germanium that decreases between the substrate and the relaxed layer.
2. (Cancelled)
3. (Currently Amended) The structure of claim [[2]] 1 wherein the first material is germanium and the concentration of germanium in the graded layer decreases from 100 percent germanium to about 40 to 80 percent germanium.
4. (Original) The structure of claim 3 wherein the relaxed layer has a substantially constant silicon concentration of about 20 to 60 percent.
5. (Original) The structure of claim 1 wherein the semiconductor substrate comprises at least one of a single crystal germanium wafer, a single Group(III)-Group(V)-semiconductor wafer, a substrate having an epitaxial germanium layer, or a substrate having an epitaxial Group(III)-Group(V)-semiconductor layer.
6. (Original) The structure of claim 1 further comprising at least one crystalline epitaxial strained layer on the relaxed layer that is composed of a second material which is different from the first material.

7. (Original) The structure of claim 6 wherein the strained layer is a silicon layer.

8. (Original) The structure of claim 6 wherein the strained layer is less than 50 nanometers thick.

9. (Original) The semiconductor structure of claim 1 further comprising:
an insulator layer; and
a base substrate, so that the structure is a crystalline epitaxial substantially relaxed layer on an insulator.

10. (Original) The structure of claim 9 further comprising a strained crystalline epitaxial layer on the insulator layer or on the substantially relaxed layer.

11. (Currently Amended) ~~[[The]]~~ A semiconductor structure of claim 9
~~further comprising:~~
a semiconductor substrate of a first material comprising germanium or a
Group(III)-Group(V)-semiconductor or alloy thereof;
a crystalline epitaxial graded buffer layer upon the first material;
a crystalline epitaxial substantially relaxed layer on the buffer layer wherein the
buffer layer is sufficiently relaxed to provide relaxation of the substantially relaxed layer
deposited thereon; and
a weakened zone in the substantially relaxed layer.

12. (Currently Amended) ~~[[The]]~~ A semiconductor structure of claim 10
~~further comprising:~~
a semiconductor substrate of a first material comprising germanium or a
Group(III)-Group(V)-semiconductor or alloy thereof;
a crystalline epitaxial graded buffer layer upon the first material;

a crystalline epitaxial substantially relaxed layer on the buffer layer wherein the buffer layer is sufficiently relaxed to provide relaxation of the substantially relaxed layer deposited thereon; and

wherein at least one of the buffer layer and the relaxed layer comprises carbon.

13. (Cancelled)

14. (Withdrawn, Currently Amended) The [[method]] structure of claim [[13]] 11 wherein the first material is germanium and the germanium concentration through the buffer layer decreases from 100 percent to about 40 to 80 percent.

15. (Withdrawn, Currently Amended) The [[method]] structure of claim 14 wherein the ~~which further comprises growing a relaxed layer~~ [[with]] has a substantially constant silicon content of about 20 percent to about 60 percent.

16. (Withdrawn, Currently Amended) The [[method]] structure of claim [[13]] 14 further comprising ~~growing on the relaxed layer~~ at least one additional crystalline epitaxial strained layer of a second material which is different from the first material, with the additional layer being present on the relaxed layer.

17. (Withdrawn, Original) The structure of claim 16 wherein the strained layer is a silicon layer.

18. (Withdrawn, Currently Amended) The [[method]] structure of claim [[13]] 11 which further comprises ~~providing~~ a weakened zone in the buffer layer to facilitate transfer of at least the relaxed layer.

19. (Cancelled)

20. (Withdrawn, Currently Amended) The [[method]] structure of claim [[19]] 1 wherein the buffer layer includes a graded layer and a substantially relaxed layer.

21. (Withdrawn, Currently Amended) The ~~[[method]]~~ structure of claim 20 wherein the weakened zone is provided in the substantially relaxed layer.

22. (Withdrawn, Currently Amended) The ~~[[method]]~~ structure of claim 21 wherein the further layer is an insulator layer, so that the insulator layer and part of the relaxed layer can be transferred.

23. (Withdrawn, Currently Amended) The ~~[[method]]~~ structure of claim 22 ~~which further comprises bonding~~ wherein the insulator layer is bonded to a base wafer, and is detached ~~detaching~~ along the weakened zone in the relaxed layer to form a semiconductor structure that includes a portion of the relaxed layer, the insulator layer, and the base wafer.

24. (Withdrawn, Currently Amended) The ~~[[method]]~~ structure of claim 23 which further comprises ~~growing~~ a strained crystalline epitaxial layer on the portion of the relaxed layer of the transfer structure.

25. (Withdrawn, Currently Amended) The ~~[[method]]~~ structure of claim 21 wherein the further layer is an epitaxially grown strained layer.

26. (Withdrawn, Currently Amended) The ~~[[method]]~~ structure of claim 25 which further comprises ~~providing~~ an insulator layer on the strained layer.

27. (Withdrawn, Currently Amended) The ~~[[method]]~~ structure of claim 26 wherein the weakened zone is provided in the boundary plane between the relaxed layer and the strained layer and ~~which further comprises bonding~~ the insulator layer is bonded to a base wafer.

28. (Withdrawn, Currently Amended) The ~~[[method]]~~ structure of claim 27 ~~which further comprises detaching along the weakened zone in the boundary plane to form a~~ semiconductor structure that includes the strained layer, the insulator layer, and the base wafer is formed after detachment along the weakened zone in the boundary plane.

29. (Withdrawn, Currently Amended) The ~~[[method]]~~ structure of claim 28 ~~which further comprises selectively removing~~ wherein any residual portion of the relaxed layer is removed from ~~[[on]]~~ the strained layer.

30. (Withdrawn, Currently Amended) The ~~[[method]]~~ structure of claim 29 wherein the strained layer is less than 50 nanometers thick.

31. (Withdrawn, Currently Amended) The ~~[[method]]~~ structure of claim 24 further comprising a heat treated ~~treating~~ the structure.

32. (Withdrawn, Currently Amended) The ~~[[method]]~~ structure of claim ~~[[19]]~~ 11 wherein the weakened zone is provided by ~~implanting~~ atomic species after depositing the further layer.

33. (Withdrawn, Currently Amended) The ~~[[method]]~~ structure of claim ~~[[19]]~~ 12 ~~wherein the further comprising doping the buffer layer and/or the relaxed layer with carbon to have a carbon composition is~~ at a level below one percent.

34. to 36. (Cancelled)

37. (Withdrawn, Currently Amended) The ~~[[method]]~~ structure of claim ~~[[34]]~~ 1 wherein the semiconductor substrate comprises at least one of a single crystal germanium wafer, a Group(III)-Group(V)-semiconductor wafer, a substrate having an epitaxial germanium layer, or a substrate having an epitaxial Group(III)-Group(V)-semiconductor layer.